

## CLAIMS

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*1st*  
*D5*

1. An amplified and non-bi-directional fiber optic link including optical loopback (18, 19, 21) of the amplifiers (13, 14; 15, 16) to enable COTDR, characterized by different wavelengths in the two transmission directions.

2. A link according to claim 1, characterized in that the wavelengths in the two transmission directions are chosen so that the backscattered signal originating from the signal in one transmission direction is strongly attenuated on passing through the receive filter of a channel in the other transmission direction.

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3. A link according to claim 1 ~~or 2~~, characterized in that the wavelengths in the two transmission directions are chosen so that the backscattered signal originating from the signal in one transmission direction is attenuated by a factor of at least 10 on passing through the receive filter of a channel in the other transmission direction.

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4. A link according to claim 1, ~~2, or 3~~, characterized by sending a wavelength division multiplex in each transmission direction, the wavelengths of the multiplex in one transmission direction being interleaved between the wavelengths of the multiplex in the other transmission direction.

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5. A method of reducing interaction between the signal in one transmission direction and backscattered noise originating from the other transmission direction in an amplified and non-bi-directional fiber optic link including optical loopback (18, 19, 21) of the amplifiers (13, 14; 15, 16) to enable COTDR, characterized by the use of different wavelengths in the two transmission directions.

6. A method according to claim 5, characterized in that the wavelengths in the two transmission directions are chosen so that the backscattered signal originating from the signal in one transmission direction is strongly  
5 attenuated on passing through the receive filter of a channel in the other transmission direction.

*Sub 6A* 7. The method claimed in claim 5 or 6, characterized in that the wavelengths in the two transmission directions are chosen so that the backscattered signal originating from the signal in one transmission direction is attenuated by a factor of at least 10 on passing through the receive filter of a channel in the other transmission direction.

8. A method according to claim 5, 6, or 7,  
15 characterized by sending a wavelength division multiplex in each transmission direction, the wavelengths of the multiplex in one transmission direction being interleaved between the wavelengths of the multiplex in the other transmission direction.

*2nd Sub 9* 9. An amplified and non-bi-directional fiber optic link including optical loopback (18, 19, 21) of the amplifiers (13, 14; 15, 16) to enable COTDR, characterized by means for widening the spectrum of the signal in at least one transmission direction.

25 10. A link according to claim 9, characterized in that the spectrum widening means comprise wavelength modulation means.

*Sub 10* 11. A link according to claim 10, characterized in that the wavelength modulation means effect wavelength modulation with a modulation rate in the range from 0.5 kHz to 10 GHz, preferably in the range from 1 kHz to 5 GHz.

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12. A link according to claim 10 or 11, characterized in that the wavelength modulation means vary the wavelength over a range greater than a few times the bit rate of the link, preferably greater than twice the bit rate of the link.

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13. A link according to any one of claims 9 to 12, characterized in that the spectrum widening means comprise means for modulating the injection current of a laser of a sender of at least one transmission direction.

10 14. A link according to any one of claims 9 to 13, characterized in that the spectrum widening means comprise phase modulation means.

15 15. A link according to claim 14, characterized in that the phase modulation means effect modulation at a modulation rate greater than a few times the bit rate of the link, preferably greater than twice the bit rate of the link.

20 16. A method of reducing interaction between the signal in one transmission direction and backscattered noise originating from the other transmission direction in an amplified and non-bi-directional fiber optic link including optical loopback (18, 19, 21) of the amplifiers (13, 14; 15, 16) to enable COTDR, characterized by widening of the spectrum of the signal in at least one transmission direction.

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17. A method according to claim 16, characterized in that the spectrum is widened by wavelength modulation.

30 18. The method claimed in claim 17 wherein the modulation rate is in the range from 0.5 kHz to 10 GHz, preferably in the range from 1 kHz to 5 GHz.

21. 19. A method according to claim 16 ~~or 17~~, characterized in that the wavelength modulation varies the wavelength over a range greater than a few times the bit rate of the link, preferably greater than twice the bit rate of the link.

22. 20. A method according to any one of claims 16 ~~to 19~~, characterized in that the spectrum is widened by modulating the injection current of a laser of a sender of at least one transmission direction.

23. 21. A method according to any one of claims 16 ~~to 20~~, characterized in that the spectrum is widened by phase modulation.

24. 22. A method according to claim 21, characterized in that the modulation rate is greater than a few times the bit rate of the link, preferably greater than twice the bit rate of the link.

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